CLAIMS

1. A method of conducting an optical inspection of a biological, chemical, or biochemical sample, the method comprising the steps of;

supporting the sample on a substrate;

directing a beam of electromagnetic radiation from a radiation source onto the substrate;

scanning the beam over the substrate by rotating the substrate about an axis substantially perpendicular to the substrate and by moving the radiation source in a direction having a component radial to said axis; and

detecting radiation reflected from and/or transmitted through the substrate and sample and providing an output signal corresponding to the detected radiation.

2. A method according to claim 1 and comprising analysing said output signal during the scanning step to identify when the beam is incident upon a calibration marking, provided at a known location on the substrate, so that the scan can be aligned relative to the calibration marking.

3. A method according to claim 1 and comprising analysing said output signal during the scanning step to extract from the output signal, digital position address information arising from modulation of at least a part of the beam by distributed electromagnetic radiation modulating means provided on the substrate, so that the

scan can be aligned relative to the substrate.

4. A method according to claim 3 wherein the sample is supported on a first side of the substrate and reflecting means are arranged on the second side of the substrate, the reflecting means incorporating said distributed electromagnetic radiation modulating means, the method comprising the steps of directing said beam of electromagnetic radiation onto the second side of the sample and detecting radiation reflected from the second side and additionally detecting radiation transmitted through the substrate and exiting therefrom through the first side, wherein analysis of the reflected radiation provides said address information and analysis of the second beam provides information on the sample to be inspected.

5. A method according to any one of the preceding claims, wherein the electromagnetic radiation is light having a wavelength in the spectrum between ultra-violet and infra-red.

6. A system for automatically carrying out an optical inspection of a sample to determine whether or not the sample comprises material which interferes with incident electromagnetic radiation, the system comprising:

a substrate having a surface for supporting the sample;

a source of electromagnetic radiation for providing a beam of electromagnetic radiation;

means for scanning said beam across said surface of

the substrate; and

detector means which in use is arranged to detect electromagnetic radiation reflected from and/or passing through the substrate and the sample, the substrate being provided with distributed electromagnetic radiation modulating means for modulating at least a part of said beam with a digitally encoded position address indicative of the location on said surface on which the beam is currently directed, the detector means being arranged to decode the modulated electromagnetic radiation beam to determine the encoded address and to determine if the received beam has been modulated by any of said material which may be present in the sample.

7. Apparatus for conducting an optical inspection of a biological, chemical, or biochemical sample supported on a substrate, the apparatus comprising;

means for supporting a substrate and for rotating the substrate about an axis substantially perpendicular to the substrate;

a source of electromagnetic radiation for providing a beam of electromagnetic radiation;

drive means for moving the radiation source over the mounted sample in a direction having a component radial to said axis so that in combination with the means for rotating the substrate the radiation beam can be scanned over the substrate; and

detector means for detecting radiation reflected from or transmitted through the substrate and sample and

for providing an output signal corresponding to the detected radiation.

8. Apparatus according to claim 7 and comprising decoding means for extracting digital address information or calibration information from said output signal, said information having been modulated onto the radiation beam by radiation modulating means provided on the substrate, and means for using said information to align the scan with the substrate.

9. Apparatus according to claim 7 or 8 wherein the detector means is a linear array of photodetectors.

10. Apparatus according to claim 9, wherein the detector means is a linear array of photodetectors extending radially with respect to the disc.

11. A substrate for use with the apparatus of any one of claims 7 to 10 and comprising means for cooperating with the mounting means to enable the substrate to be mounted and rotated.

12. A substrate according to claim 11 for use with the apparatus of claim 8 and comprising a substantially transparent sheet having a calibration marking provided thereon for modulating the radiation beam.

13. A substrate according to claim 11 for use with the apparatus of claim 8 and comprising distributed radiation modulating means for modulating at least a part of the beam with digitally encoded address information so that the location on the surface of the substrate on which the beam is incident may be

determined.

14. A substrate according to claim 13, wherein the distributed electromagnetic radiation modulating means comprises a sequence of spaced apart address codes.

15. A substrate according to any one of claims 11 to 14 and comprising a sample support surface having a three dimensional topography arranged to receive the sample.

16. A substrate according to any one of claims 11 to 14, and comprising a sample support surface on which is provided chemical or biochemical reagents arranged to interact with the sample to produce a change in the optical characteristics thereof.

AMENDED CLAIMS

[received by the international Bureau on 29 February 1996 (29.02.96); original claims 1-16 replaced by amended claims 1-13 (4 pages)]

1. A method of conducting an optical inspection of a biological, chemical, or biochemical sample, the method comprising the steps of:

supporting the sample on a substrate;

directing a beam or beams of electromagnetic radiation onto the substrate;

scanning the beam(s) over the substrate by rotating the substrate about an axis substantially perpendicular to the substrate and by moving the radiation source(s) in a direction having a component radial to said axis;

detecting radiation reflected from and/or transmitted through the substrate and sample and providing an output signal or signals corresponding to the detected radiation; and

analysing the output signal(s) to extract information on the sample being inspected,

characterised by the steps of:

simultaneously analysing the output signal(s) during the scanning step to extract therefrom, digital position address information arising from modulation of at least a part of the beam(s) by distributed electromagnetic radiation modulating means provided on the substrate, so that the scan can be aligned relative to the substrate.

2. A method according to claim 1 and comprising directing a single beam of radiation at the substrate from a single radiation source.

3. A method according to claim 2 wherein the sample is supported on a first side of the substrate and reflecting means are arranged on the second side of the substrate, the reflecting means incorporating said distributed electromagnetic radiation modulating means, the method comprising the steps of directing said beam of electromagnetic radiation onto the second side of the sample and detecting radiation reflected from the second side and additionally detecting radiation transmitted through the substrate and exiting therefrom through the first side, wherein analysis of the reflected radiation provides said address information and analysis of the second beam provides information on the sample to be inspected.

4. A method according to any one of the preceding claims, wherein the electromagnetic radiation is light having a wavelength in the spectrum between ultra-violet and infra-red.

5. Apparatus for conducting an optical inspection of a biological, chemical, or biochemical sample supported on a substrate, the apparatus comprising;

means for supporting a substrate and for rotating the substrate about an axis substantially perpendicular to the substrate;

means for providing a beam or beams of electromagnetic radiation;

drive means for moving the radiation beam(s) over the mounted sample in a direction having a component radial to

said axis so that, in combination with the means for rotating the substrate, the radiation beam(s) can be scanned over the substrate;

detector means for detecting radiation reflected from or transmitted through the substrate and sample and for providing an output signal or signals corresponding to the detected radiation wherein said output signal(s) contain information produced by modulation of the beam(s) by the sample to be inspected,

the apparatus being characterised by:

decoding means for simultaneously extracting digital address information or calibration information from said output signal(s), said information having been modulated onto the radiation beam or beams by radiation modulating means provided on the substrate, and means for using said information to align the scan with the substrate.

6. Apparatus according to claim 5 wherein the detector means is a linear array of photodetectors.

7. Apparatus according to claim 6, wherein the detector means is a linear array of photodetectors extending radially with respect to the disc.

8. A substrate for use with the apparatus of any one of claims 5 to 7 and comprising means for cooperating with the mounting means to enable the substrate to be mounted and rotated.

9. A substrate according to claim 8 for use with the apparatus of claim 5 and comprising a substantially transparent sheet having a calibration marking provided

thereon for modulating the radiation beam(s).

10. A substrate according to claim 8 for use with the apparatus of claim 5 and comprising distributed radiation modulating means for modulating at least a part of the beam(s) with digitally encoded address information so that the location on the surface of the substrate on which the beam(s) is or are incident may be determined.

11. A substrate according to claim 10, wherein the distributed electromagnetic radiation modulating means comprises a sequence of spaced apart address codes.

12. A substrate according to any one of claims 8 to 11 and comprising a sample support surface having a three dimensional topography arranged to receive the sample.

13. A substrate according to any one claims 8 to 11 and comprising a sample support surface on which is provided chemical or biochemical reagents arranged to interact with the sample to produce a change in the optical characteristics thereof.